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(54) **METHOD AND APPARATUS FOR RETAINING GAS CYLINDERS**

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A47G 29/00 (2006.01)

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See application file for complete search history.

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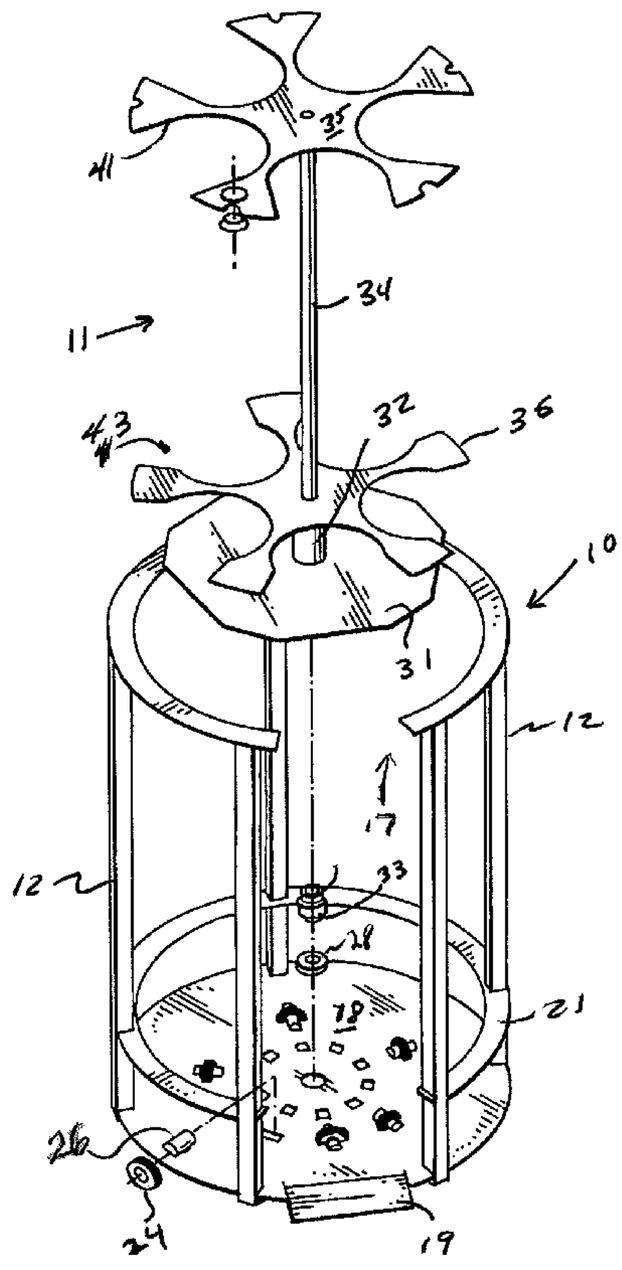
(57) **ABSTRACT**

A storage and retention unit for gas cylinders is provided wherein a movable inner frame defines a plurality of cylinder receptacles which are indexed from an opening in a surrounding outer frame about an axis such that any cylinder within a receptacle is restrained by the outer frame and inner frame as it advances about the axis until the receptacle returns to the opening.

4 Claims, 2 Drawing Sheets



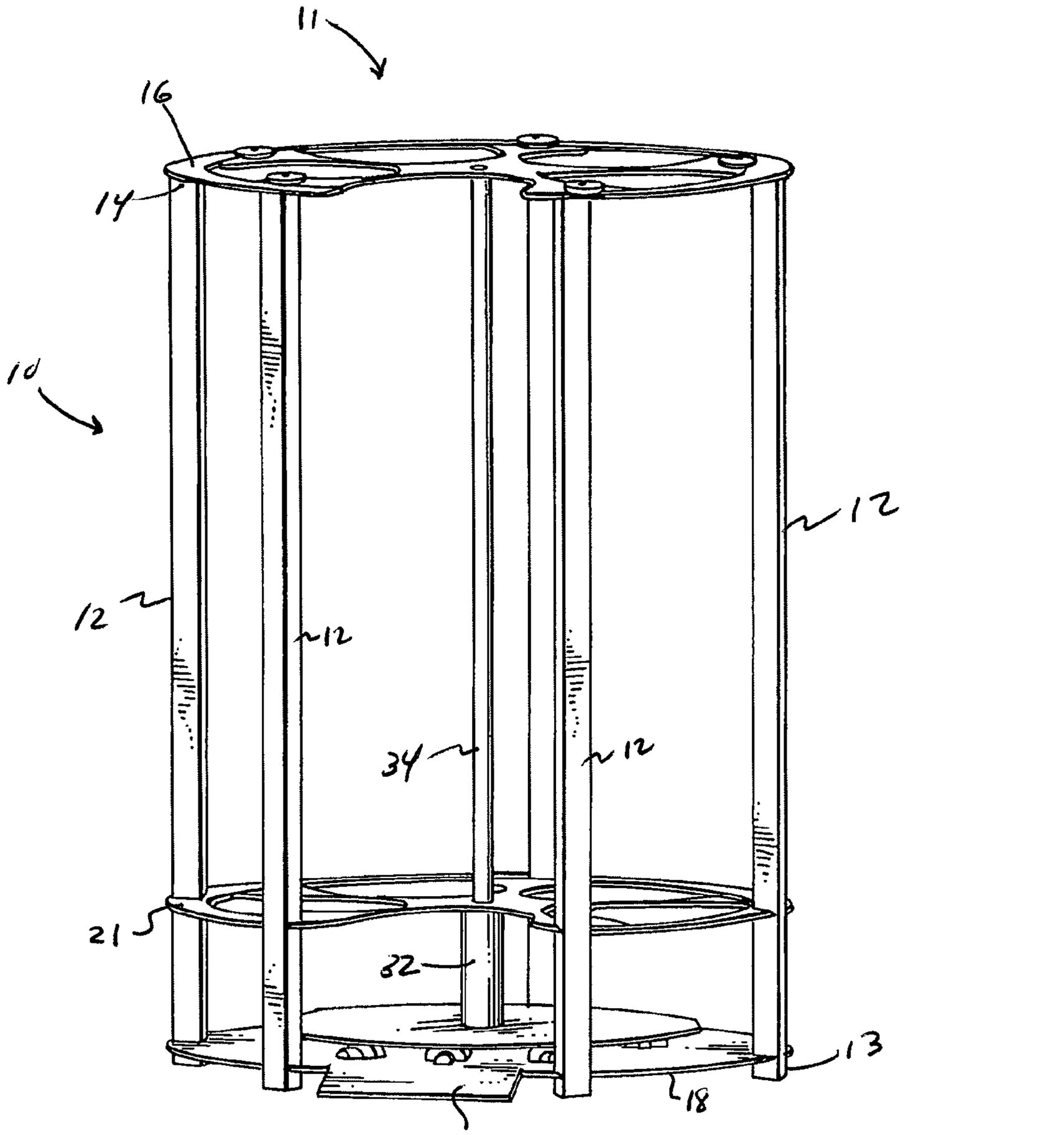


Fig_1

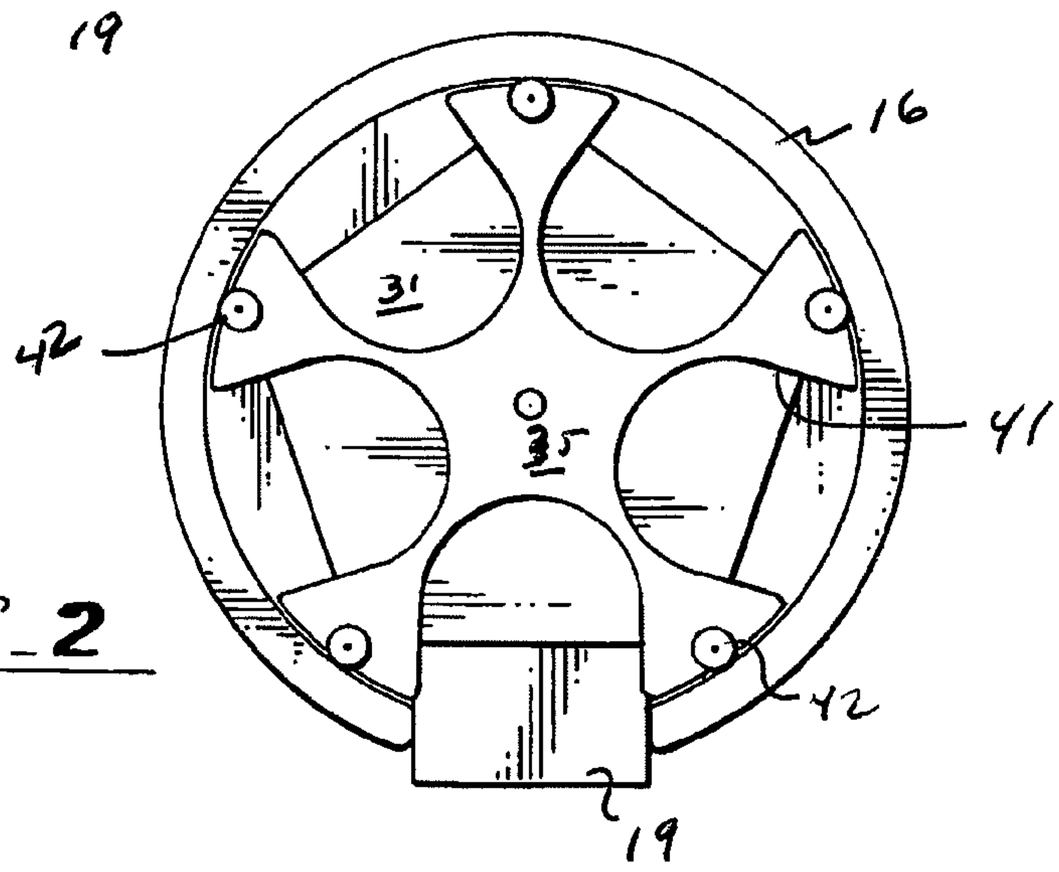


Fig_2

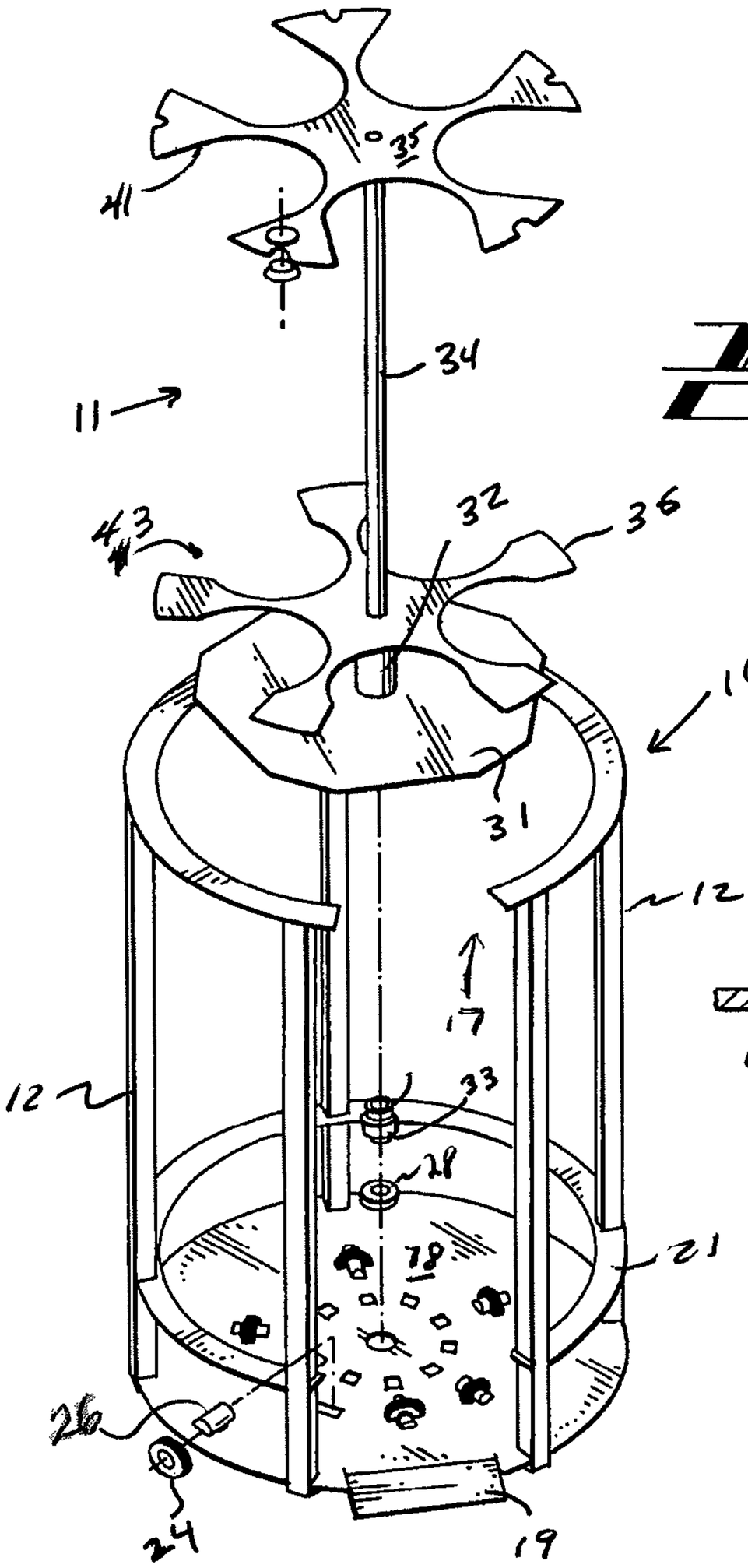
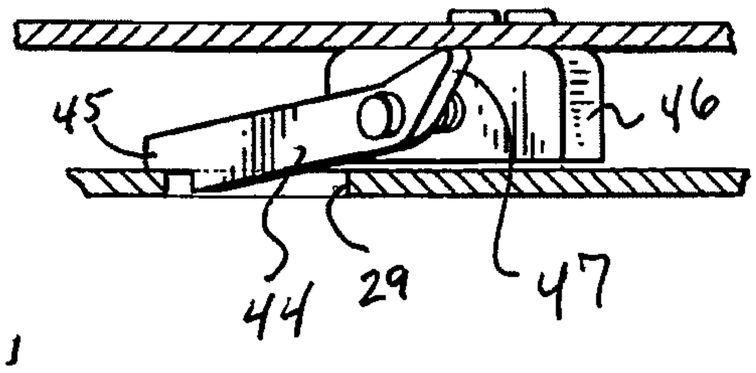


Fig_5

Fig_3



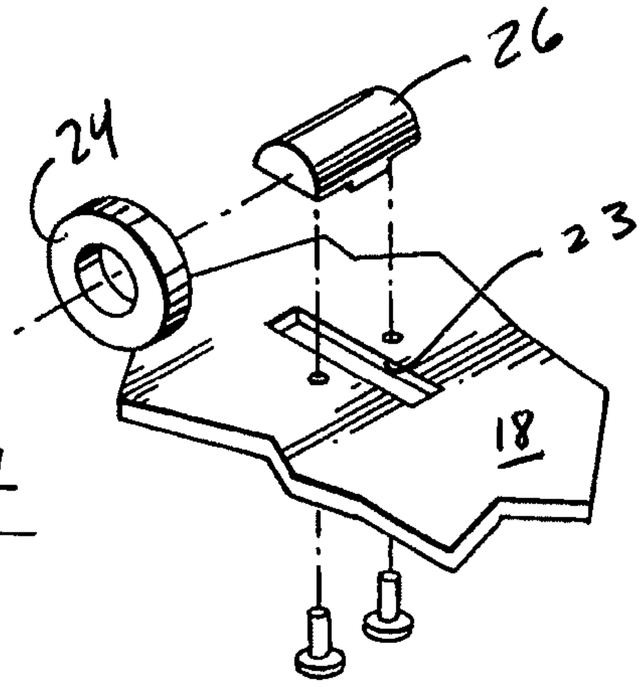


Fig_4

METHOD AND APPARATUS FOR RETAINING GAS CYLINDERS

The present invention relates to the retention of gas cylinders and more particularly to the safe storage and retention of such cylinders. More particularly the present invention relates to storage and retention of groups of cylinders. In greater particularity the present invention relates to a carousel for storing and retrieving gas cylinders.

BACKGROUND OF THE INVENTION

Gas cylinders as referred to in this application are commonly used to hold various gases such as oxegen, nitrogen, and other gases used in industrial applications such as welding and the like. Typically, such cylinders are substantially longer than they are wide and are susceptible to falling over when resting on their bottom. The tops of such cylinders usually include the valve works by which the cylinders are filled and depleted. When such a cylinder is pressurized with a gas, a potentially hazardous situation can be created by improperly storing such cylinders. If the cylinders are stored upright as is typical and one of the cylinders topples over, damage to the cylinder top or casing can turn the cylinder into an uncontrolled projectile weighing over one hundred pounds and capable of severely damaging adjacent property and personnel. Accordingly, a need exists for a safe system for storing and retaining such cylinders.

Secondly, a need exists for storage of the cylinders which facilitates inventory reconciliation. By way of example, there is no way to visually distinguish empty cylinders from full cylinders and no way to quickly ascertain how many cylinders of a group of cylinders are full. Likewise it is difficult to determine which cylinder among a group of cylinders has been in inventory the longest. Therefore, a need exists for a better system of inventorying cylinders in storage.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a retainer for gas cylinders which will prevent such cylinders from toppling over and which will arrange the cylinders for rapid and easy deployment.

It is a further object of the invention to provide such a retainer which will facilitate use of the oldest cylinder in a group first.

It is a further object of the invention to improve the ability of a user of gas cylinders to control his inventory of such cylinders.

BRIEF DESCRIPTION OF THE DRAWINGS

Apparatus embodying the features of this invention are depicted in the accompanying drawings which form a portion of this disclosure and wherein:

FIG. **1** is a perspective view of the gas cylinder carousel,

FIG. **2** is a top view of the gas cylinder carousel;

FIG. **3** is a detailed view of an embodiment of the latch assembly

FIG. **4** is a detailed view of an embodiment of the support bearing assembly

FIG. **5** is an exploded view of the carousel.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings for a clearer understanding of the invention, it may be seen that the present invention is a specialized form of a carousel. In the embodiment shown in the figures an outer frame **10** supports an inner frame **11** and retains a plurality of gas cylinders, not shown, therein. Outer frame **10** includes a plurality of legs **12**, one end **13** of each leg **12** rests on the floor or other surface on which the carousel is to be supported. The other end **14** of each leg **12** is affixed to a top ring **16**, such as by welding or any other acceptable means of attachment. Top ring **16** is split to define an opening **17** intermediate two of the legs **12**. A base plate **18** is interposed between legs **12** and affixed to each of them at a position slightly elevated relative to the underlying floor. A ramp **19** is affixed to base plate **18** directly under opening **17** and extends from base plate **18** to the floor. A lower ring **21** is affixed to legs **12** at a height above base plate **18** and like ring **16** is split to define an opening aligned beneath opening **17** and above ramp **19**. Outer frame in this embodiment is made from metal, such as steel, however, the material used in outer frame need only have sufficient strength and rigidity to perform its functions, therefore other acceptable materials may include various composites or high strength plastics.

Base plate **18** has a plurality of slots **23** formed therein along and perpendicular to a plurality of spaced apart radians. Slots **23** each accommodate a weight supporting bearing **24** mounted on a bearing mount **26** affixed to base plate **18** such that bearing **24** is supported above the underlying floor and is freely rotatable about mount **26**. A central aperture **27** is formed in base plate **18** and a flanged bearing **28** is press fit there into. A plurality of latch stops **29** are formed in base plate **18** around and spaced from aperture **27**.

Movable inner frame **11** is supported on bearings **24** and **28**. A rotating plate **31**, which serves as a cylinder support member, is affixed to a spacer tube **32** with a bearing **33** affixed into a lower end thereof. Bearing **33** mates with flanged bearing **28** and extends therein to. A center pole **34** is secured in the upper end of spacer tube **33** and has an upper end affixed to the center of a cylinder holding plate **35**, thereby defining the central axis about which inner frame **11** rotates. A bottom cylinder holding plate **36** is affixed to spacer tube **33** and center pole **34** at the same height as bottom ring **21**.

Cylinder holding plate **35** is circular, but a plurality of U shaped recesses **41** are spaced about the circumference of plate **35**. Recesses **41** are sized to receive the body of a gas cylinder therein. In the illustrated embodiment, there are five such recesses **41**, however the number of recesses is a matter of choice based on the number of cylinders to be stored in one carousel. The carousel can be appropriately sized to yield more recesses, the recesses may be extended to accommodate an additional cylinder and other variations may be employed. Intermediate the recesses **41**, plate **35** extends outwardly toward top ring **16** and carries a set of rollers **42** which engage ring **16** and holds the plate **35** in spaced relation to ring **16**. Bottom cylinder holding plate **36** also is circular and has a series of cut-outs **43** which are vertically aligned with recesses **41**. Cut-outs **43** are appropriately sized to receive a cylinder body therein, such that recesses **41** and cut-outs **43** form a cylinder receptacle within inner frame **11**, with the bottom of the cylinder resting on rotating plate **31** and the body of the cylinder received in the cut-outs and recesses.

A latch lever **44** is pivotally mounted to a bracket **46** affixed to the bottom of plate **31** at a distance from spacer tube **32** equal to the distance from the bearing **28** to the latch stops **29**. Lever **44** has a free end **45** and a pivot end **47**. In the illustrated embodiment free end **45** rests on base plate **18** due to gravity. The latch stops **29** are actually apertures in base plate **18** which are sized such that free end **45** drops into the apertures as inner frame **11** is rotated. Rotation of inner frame **11** in a

direction from free end **45** toward pivot end **47** withdraws the free end from the aperture stop **29**, however rotation in the opposite direction urges free end **45** against the portion of the base plate **18** defining the aperture stop **29** arresting the rotation, thus the lever and aperture stop form an indexing latch that allows rotation of the inner frame only in one direction. The structure illustrated is but exemplary of one way to form an indexing latch. Clearly, spring loaded latch mechanisms may be employed and mounted to engage stops on either base plate **18** or rotating plate **31**. Likewise, one way cam followers can be used to create an indexing latch to limit rotation of inner frame **11** to a single direction. In the preferred embodiment, and in any alternative embodiments the indexing latch will have the latch stops **29** positioned such that rotation of frame **11** from one stop to the next will move the cylinder receptacles defined by recess **41** and cutout **43** into vertical alignment with one of the support bearings **26**, such that the bottom of rotating plate is supported on bearing **26** directly beneath the position that a gas cylinder would rest on rotating plate **31**. It will be noted in the Figures that one such bearing **26** is located adjacent ramp **19** and centered on openings **17** and **22**. The latch stops **29** are spaced such that alternating stops place one of the gas cylinder receptacles into alignment with ramp **19** and openings **17** and **22** such that gas cylinders can be loaded into or removed from the receptacle. The remaining stops position frame **11** such that no receptacle is aligned with ramp **19** or openings **17** and **22**, such that no cylinders may be loaded or removed from the receptacles.

It should be understood from the foregoing that only one receptacle at a time may be aligned with opening **17** and that inner frame **11** may be advanced in only one direction, thus once a cylinder is loaded into a receptacle the frame must rotate 360 degrees before that cylinder can be removed, thus for each subsequent cylinder loaded into the frame, the first loaded cylinder will precede to the opening. In this manner the first loaded cylinder will always be the first cylinder available for removal from the frame thus facilitating inventory control to the extent that the "oldest" cylinder will become the first available for use. Further, upon loading a cylinder in any receptacle rotating the inner frame to the next stop secures all cylinders within the receptacles of inner frame **11** and the rings of outer frame **10**.

It may be readily understood that the carousel has a much more stable height to bottom area ratio than an individual gas cylinder and the weight of the combined cylinders with this carousel renders the carousel and retained cylinders virtually impervious to tipping in the normal course of events. Ramp **19** facilitates transferring the cylinders into or out of the carousel. If empty cylinders are to be stored in the same carousel as cylinders containing usable gas, then the cylinder or a portion of the inner frame near the cylinder can be marked to indicate that the cylinder is empty. Accordingly the user can quickly look at the carousel and tell empty from usable cylinders.

While I have presented only one embodiment of the invention, the invention is not so limited but rather is intended to encompass the full scope of the appended claims.

What I claim is:

1. An apparatus for retaining elongated gas cylinders comprising:

a. a stationary outer frame including an upper annular ring

b. a movable circular inner frame mounted within said outer frame for rotation about a central axis, said inner frame defining a plurality of gas cylinder receptacles opening outwardly relative to said central axis and including a horizontally extending upper plate wherein said upper plate extends outwardly intermediate said receptacles toward said upper ring and carries a set of rollers which engage said upper ring and hold said upper plate in spaced relation to said upper ring, at least one vertical member connecting said upper plate to a cylinder support member with a plurality of bearings supporting said cylinder support member; wherein said stationary outer frame defines an opening for ingress and egress of said cylinders into one of said gas cylinder receptacles only when said receptacle is aligned with said opening; and a latch coupling said movable inner frame and said stationary outer frame and limiting rotation of said inner frame to a first direction about said central axis and wherein said latch aligns at least one of said cylinder receptacles of said inner frame over at least one of said supporting bearings.

2. Apparatus as defined in claim **1** wherein said latch comprises a pivotally mounted lever having a free end movable between a normal position and a displaced position and at least one stop positioned to abut said free end of said lever when said inner frame is urged in a direction opposite to said first direction.

3. Apparatus as defined in claim **1** wherein said inner frame is selectively movable from an access position wherein one of said gas cylinder receptacles is aligned with said opening to a closed latched position where none of said plurality of gas cylinder receptacles is aligned with said opening.

4. Apparatus as defined in claim **3** wherein said latch comprises a pivotally mounted lever having a free end movable between a normal position and a displaced position and at least one stop positioned to abut said free end of said lever when said inner frame is urged in a direction opposite to said first direction.

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